PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

Date of mailing *(day/month/year)*	28.03.2011
Applicant's or agent's file reference	**IMPORTANT NOTIFICATION**
P43568.WO/HENDRYN	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB2009/051347	08.10.2009	08.10.2008

Applicant
Pursuit Dynamics PLC.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international preliminary examining authority:

European Patent Office P.B. 5818 Patentlaan 2
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
P43568.WO/HENDRYN		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB2009/051347	08.10.2009	08.10.2008

International Patent Classification (IPC) or national classification and IPC

INV. B01D17/04

Applicant

Pursuit Dynamics PLC.

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☒ *sent to the applicant and to the International Bureau)* a total of 2 sheets, as follows:
      ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3*bis* of Annex C of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
2010-08-09	28.03.2011

Name and mailing address of the international preliminary examining authority:

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/GB2009/051347

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3(a) and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4(a))
   - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-27 as originally filed

Claims, Numbers

1-10 filed with the letter of 04-03-2011

Drawings, Sheets

1/3-3/3 as originally filed

☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☒ the claims, Nos. 1-13
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:

5. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 70.2 (e)).

6. ☐ Supplementary international search report(s) from Authority(ies) have been received and taken into account in drawing up this report (Rule 45bis.8(b) and (c)).

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-10
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-10
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V.

1.Reference is made to the following documents:

D6: US2083801 (EDDY HAROLD C [US]) 6 September 1932 (1932-09-06) newly introduced document

2.INDEPENDENT (AMENDED) CLAIM 1

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of amended claim 1 does not involve an inventive step in the sense of Article 33(3) PCT.

The document D6 is regarded as being the prior art closest to the subject-matter of amended claim 1, and discloses (figure 3, claim 2, page 1 left column line 31-36, page 1 right column line 43-53, page 3 left column line 52 - page 3 right column line21):

A method of demulsifying an emulsion, the method comprising the steps of:

supplying the emulsion (via pipe 58) to a fluid processor passage having an inlet (64 at the branch of manifold chamber 67) and an outlet (end of 63), wherein the cross sectional area of the passage between the inlet and outlet does not reduce below the cross sectional area at the inlet (outlet 63 is wider than inlet of 64 at branch of manifold chamber 67);

supplying a transport fluid (gas via annular space 56) from a transport fluid source to a transport fluid nozzle (gas passage 65) which circumscribes the passage and opens into the passage intermediate said inlet (64 at branch of manifold chamber 67) and said outlet (end of 63 which is downstream of the end of 64, see figure 3);

accelerating the transport fluid through a throat of the transport nozzle, the throat having a cross sectional area which is less than that of a nozzle inlet (the annular gas passage is reduced from the gas manifold chamber 60 into the gas discharge space 65);

injecting the transport fluid from the nozzle outlet (end 65) into the emulsion in the passage such that the emulsion is atomised and a vapour-droplet regime is formed comprising a dispersed phase of emulsion droplets within a continuous vapour phase;

vaporising at least some of the emulsion droplets within the vapour-droplet regime; and

condensing the vapour back to the liquid phase.

The subject-matter of claim 1 therefore differs from this known method of demulsifying an emulsion in that the transport fluid is flowed through a throat having a cross sectional area which is less than that of a nozzle outlet (passage 65).

The technical effect of flowing the transport fluid through a throat having a cross sectional area which is less than that of a nozzle outlet is not established as the atomisation of the emulsion by a transport fluid is also achieved by the passage 65 in the method described in D6.

The problem to be solved by the present invention may therefore be regarded as an alternative means to atomise the emulsion by a transport fluid.

The solution proposed in amended claim 1 of the present application cannot be considered to involve an inventive step (Article 33(3) PCT):

Convergent-divergent nozzles are generally well known in the art and commonly used to increase speed of a fluid flowing there through. The difference of the shape of the nozzle is a slight constructional change in the apparatus used for the method of amended claim 1 which comes within the scope of the customary practice followed by persons skilled in the art.

Hence, the subject-matter of (amended) claim 1 lacks an inventive step (Article 33(3) PCT).

Note: Due to the high gas speed in the annular restriction (65) followed by the enlargement at the end of nozzle 64 cavitation and atomisation of the emulsion will occur whereby some emulsion droplets will be vaporising and condensing thereafter.

(The atomised emulsion is additionally exposed to an electrical field which further enhances demulsification of the emulsion).

3.DEPENDENT CLAIMS

Dependent claims 2-10 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, the reasons being as follows:

-claim 2: D6 (page 3 left column line 40-47) discloses a settling tank 46 separating the condensed constituents.

-claim 3: The gas stream in D6 having a high velocity implies that it is released from a source as a compressed gas.

-claim 5: D6 (claim 2) specifies the emulsion to be an emulsion of oil and water.

-claims 4,6-10: The features of these claims pertain to merely one of several straight-forward possibilities (steam, agent, diluent and location of their introduction) from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to achieve the known effects of said features.

CLAIMS:

1. A method of demulsifying an emulsion, the method comprising the steps of:

supplying the emulsion to a fluid processor passage having an inlet and an outlet, wherein the cross sectional area of the passage between the inlet and outlet does not reduce below the cross sectional area at the inlet;

supplying a transport fluid from a transport fluid source to a transport fluid nozzle which circumscribes the passage and opens into the passage intermediate the inlet and the outlet;

accelerating the transport fluid through a throat of the transport nozzle, the throat having a cross sectional area which is less than that of both a nozzle inlet and nozzle outlet;

injecting the transport fluid from the nozzle outlet into the emulsion in the passage such that the emulsion is atomised and a vapour-droplet regime is formed comprising a dispersed phase of emulsion droplets within a continuous vapour phase;

vaporising at least some of the emulsion droplets within the vapour-droplet regime; and

condensing the vapour back to the liquid phase.

2. The method of claim 1, further comprising the step of separating the condensed constituents of the emulsion in a separation vessel.

3. The method of claim 1 or claim 2, wherein the transport fluid is a compressed gas.

4. The method of any preceding claim, wherein the transport fluid source is a steam generator and the transport fluid is steam.

5. The method of claim 4, wherein the emulsion is an emulsion of water and crude oil.

6. The method of claim 5, wherein the steam generator also supplies steam to a steam-based crude oil extraction process.

7. The method of any preceding claim, further comprising the step of adding a demulsifying agent to the emulsion via an additive port immediately downstream of the nozzle outlet in the passage.

8. The method of any preceding claim, further comprising the step of adding a diluent to the emulsion prior to supplying the emulsion to the fluid processor passage.

9. The method of any of claims 1 to 7, further comprising the step of adding a diluent to the emulsion via an additive port in the passage immediately downstream of the transport fluid nozzle.

10. The method of any preceding claim, further comprising adding a compressed gas to the emulsion upstream of the fluid processor.